MIDDLESEX SAMPLING PLANT
239 Mountain Avenue
Middlesex

Middlesex County
New Jersey

HAER No. NJ-107

HAER
NJ
12-MIDSX,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, P.A. 19106

HISTORIC AMERICAN ENGINEERING RECORD

MIDDLESEX SAMPLING PLANT

HAER NO. NJ-107

HAER NJ 12-MIDSX 1-

Location: 239 Mountain Avenue
Middlesex, Middlesex County
New Jersey
UTM: Zone 0018, Easting 542994.49963, Northing 4491095.76065
Quad: Plainfield, New Jersey, 1:24,000

Dates of Construction: 1910, 1949-1950

Engineer/Architect: Unknown

Present Owner: U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Present Use: Bechtel site supervision

Significance: This complex was one of a number of American companies chosen by the Manhattan Engineer District/Atomic Energy Commission to process uranium for use in the development of atomic weapons. From 1943-1967 the plant processed, sampled, blended, and stored uranium, beryllium, and thorium ore before sending it to other companies for refining. This work was part of a top-secret nationwide fabricating effort during World War II to develop an atom bomb, and post-war, to create atomic weapons as part of President Harry S. Truman's Cold War policy of military supremacy over the Soviet Union.

Project Information Statement: The Formerly Utilized Sites Remedial Action Program (FUSRAP) of the U.S. Department of Energy (DOE) will demolish the process building and the boiler house as part of site remediation and decontamination. A Memorandum of Agreement between the DOE-Former Sites Restoration Division (FSRD) and the New Jersey SHPO, stipulated HAER documentation to mitigate this adverse effect. This documentation was undertaken to fulfill this stipulation.

Alexandra C. Cole
Formerly Utilized Sites Remedial Action Program
Contract No. DE-AC05-91OR21950
Science Applications International Corporation (SAIC)
816 State Street, Suite 500
Santa Barbara, CA 93101

NARRATIVE OVERVIEW OF THE COMPLEX

The Middlesex Sampling Plant (MSP), located in the industrial area of Middlesex, New Jersey, is a complex of four buildings constructed between 1910 and 1950 on a 9.6-acre property. A two-story brick warehouse and its adjacent one-story boiler house, built in 1910, are the major buildings on-site. A one-story concrete-block administration building is located near the entrance to the site, with an adjacent wood frame garage. Two large covered waste piles housing contaminated soil lie to the rear of the property. The area is largely paved, with the exception of a lawn surrounding the administration building. A chain link fence surrounds the property. Residential and light commercial areas abut the property on the south and west, a car wrecking and salvage yard and the Lehigh Valley railroad tracks are adjacent to the north, and the entrance road lies to the east.

The area where MSP is located was originally part of Piscataway, an agricultural area settled by Dutch and English farmers in the 17th century on land bought from the Leni Lenape Indians (*Middlesex County Area Guidebook* 1989:18). By the end of the 19th century Silas Dewey Drake, an entrepreneur with industrial aspirations, bought a portion of this farmland in Piscataway to start a fledgling industrial park. Forming the New Jersey Mutual Realty Company in 1898, he bought two farms from John D. Voorhees and subdivided them into streets and lots for industrial development. He named this section of town Lincoln in honor of Abraham Lincoln. He advertised the industrial benefits of Lincoln, and shortly thereafter the first three factories were established there. Lincoln developed rapidly and soon petitioned Piscataway for such civic improvements as sidewalks, street lights, and fire hydrants. Piscataway, being largely agricultural, did not agree to such improvements; as a result, Middlesex became its own borough in 1913 (Zollinger 1963:18-21).

Drake's vision of industry in Middlesex became a reality with many new industrial plants developed along the main street of town, named Lincoln Boulevard, in the teens and twenties. Four railroad lines, the Lehigh Valley, Reading, Baltimore & Ohio, and the Central Railroad of New Jersey, passed through Middlesex. Such industries as Watchung Labs, F. Reed Burns Emery Paste, Pioneer Latex and Chemical, Savary & Glaser Structural Steel, Philips Lens, Fabricated Plastic Film Items, American Velour Mills, and Pathe, were located in town (Sanborn Company Map "Boundbrook" 1927).

By 1939 the town was actively advertising its industrial benefits: 27 miles from New York City, a positive labor force, 8 miles of industrial property along the railroad tracks with sidings available, and outlets to the new highways 22, 28, and 29. At that time, 378 industries producing 548 different items were located in Middlesex County (*Middlesex Pictorial* 1939: 4, 68-79).

One of the industries located in Middlesex was an asphalt paint company at 239 Mountain Avenue, the current MSP site. The plant was built in 1910, and included a large brick warehouse, boiler house, garage, administration building, a dye warehouse, and four smaller outbuildings (See Sanborn Map 1927). The name of the paint manufacturer is unknown. The company went broke in 1913 and was bought by American Marietta Company, a conglomerate of businesses run by Grover Hermann and his family in Callicoon, New York. One of Hermann's best-selling products was asphalt paint from this Middlesex manufacturer. When the paint company experienced financial difficulties, American Marietta bought it. Under new management the American Asphalt Company became successful, particularly after American Marietta added other colors, such as aluminum, to the standard black available (Sloan 1983: 160).

In October 1943, the U.S. Army Corps of Engineers leased the brick warehouse at 239 Mountain Avenue from the American Marietta Corporation for the Manhattan Engineer District (MED) as one of a number of industrial sites chosen to perform different operations as part of the United States' top-secret development of the atom bomb. The chief ingredient in the production of the bomb was uranium, and its chief source was uranium ore from the Belgian Congo (Zaire). A stockpile of 1,200 tons of this ore, stored since 1940 at the Archer Daniels Midland warehouse on Staten Island, was purchased in 1942 from Edgar Sengier of the African Metals Corporation by the U.S. Army. Far greater tonnage of ore was gradually shipped from the Congo to the United States between 1942 and 1946. The great quantities of ore shipped required storage; the capacity of existing processing plants could not handle it. Three storage areas were chosen by MED: Seneca Ordnance Depot, Romulus, New York; Clinton Engineer Works (Oak Ridge National Laboratory), Clinton, Tennessee; and the Middlesex Sampling Plant (known at that time as the Perry Warehouse). Because of its proximity to the New York piers, MSP was also chosen as the site to sample, weigh, and assay ore (Hewlett and Anderson 1990: 291; DOE 1980: 3).

MSP's chief functions were to thaw, crush, dry, screen, store, sample, weigh, and ship the uranium ore to refineries. The need for sampling the ore rather than merely sending it to processing plants for refinement occurred because African Metals Corporation sold MED only the recoverable uranium oxide (U_3O_8) within the ore, retaining ownership of the residue that contained other precious metals (the Congo ore contained anywhere from 5 percent to 65 percent uranium oxide). It was therefore necessary for MED to create weighing and assaying operations to determine what the percentage of oxide was in any given lot of ore. Originally the weighing and assaying took place at individual contractor's plants, but after November 1943, a separate sampling program was established at MSP, and it handled sampling of all the ores, as well as some weighing and assaying (U.S. Department of Energy 1980: 3-4). Because the residue from the initial refining of the Belgian Congo ore to black oxide or sodium di-uranate concentrates was owned by African Metals, it had to be stored until it could be returned to the owner. Tailings containing greater than 10 percent uranium oxide were stored at MSP or Oak Ridge (DOE 1980:4).

Once the ore was sampled, weighed, and assayed, it was shipped from MSP to the Linde Refinery, Tonawanda, New York, where it was processed into black oxide or sodium di-uranate concentrates. These materials were then refined into orange oxide at the Mallinckrodt Chemical Company in St. Louis, Missouri and E.I. du Pont de Nemours and Company, Deepwater, New Jersey. The orange oxide was further refined to green salt (UF4) by du Pont, Mallinckrodt, the Linde refinery, and the Harshaw Chemical Company in Cleveland, Ohio. The green salt was used to manufacture uranium metals at du Pont; Mallinckrodt; Iowa State College, Ames, Iowa; Westinghouse in Bloomfield, New Jersey; Brush Laboratories in Cleveland, Ohio, and Electromet, Niagara Falls, New York. These metals were then shipped to the Hanford nuclear reactors at Richland, Washington for use in plutonium production, and from there the plutonium was shipped to Los Alamos for use in developing the atom bomb, and later the weapons development program (DOE 1980:5).

When MED took over the MSP site in 1943, it contracted with the Perry Warehouse Corporation to provide labor, which included a plant supervisor, a storekeeper, a health & safety technician, twelve security police, and four clerk typists, a plant foreman, and a labor force to perform the sampling, crushing, and handling of the ore. MED contracted with Lucius Pitkin, Inc. of New York City to represent the U.S. Government in the technical aspects of sampling and weighing, providing two supervisors knowledgeable in sampling and two technicians who performed the sampling. The African

Metals representative in the sampling process was the LeDoux Company of New York City, which had an observer at MSP for the weighing functions. Pitkin was also responsible for the security of the laboratory in the process building, supervision of dust control operations, and examination of the machinery and equipment for damage and wear (Cahalane 1958: 8-9).

In September 1946, the leased facilities were purchased by condemnation by the Atomic Energy Commission (AEC), successor to the MED, from the American Marietta Corporation. Various new buildings were constructed, including a replacement for the old administration building, a replacement garage, a thaw house, and a storage house (see 1958 map). The approximately 9.6-acre site was surrounded by a chain link fence. Eight of these acres were paved with asphalt to provide a drum storage area. Uranium oxide (Q-11) remained the chief material sampled, but after 1950, magnesium di-uranate precipitate (MgX), and beryl ore (INX) were also sampled there.

In May 1950, the operation of MSP was contracted by AEC to the United Lead Company, a subsidiary of the National Lead Company of Cincinnati, Ohio, in the interests of more efficient administration. At the end of 1955, sampling of Q-11 and MgX was terminated at MSP and transferred to the Fernald Feed Materials Processing Center at Fernald, Ohio. Sampling of INX had already been transferred to Fernald in 1954. Equipment was decontaminated; in the process some 17,000 pounds of dead-bed material was recovered. Much of the sampling equipment from the process building was then sent to Fernald for use, including jaw crushers, pulverizers, rotap screens, drying ovens, dust collectors, machine tools, and trucks. The remaining items were advertised for bid and sold. Out-of-service equipment was stripped and sold as salvage. Contaminated drums were baled and disposed of at sea. At the time of moth-balling the buildings, all remaining moveable process equipment was removed from the process building and stored in other buildings (Cahalane 1958:43-4).

From 1955 to 1967 MSP was used to sample and store thorium residues. In 1967 all AEC work stopped at MSP and the site was decontaminated and given in February 1968 to the General Services Administration, which in turn transferred the facilities in 1969 to the Department of the Navy. From 1969 to 1979 the buildings were used by the U.S. Marine Corps, Sixth Motor Transport Battalion as a reserve training center (Ford, Bacon & Davis Utah, Inc. 1979: 2-3).

MSP was placed in DOE custody in 1980 when residual radioactive contamination was found. MSP is part of DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP).

BUILDING DESCRIPTION AND USE

When MED leased the property from the American Marietta Company in 1943, there were 12 buildings on the property, including a brick warehouse, boiler house, garage, administration building, and five smaller outbuildings, although MED appeared to have used only the process building, the boiler house, and the wood frame administration building. After purchasing the property in 1946, MED tore down several of the buildings and added others, such as the administration building, garage, thaw house, dumping station, and Quonset hut storage facility. Building 1, the original brick warehouse (process building) was used to sample and assay the ore; Building 2, a concrete block thaw house, stored ore that needed to be thawed; Building 3, the boiler house, contained the boiler for heating the warehouse; Building 4, a steel and corrugated metal Quonset hut was used for enclosed storage; Building 5, a wood

frame garage covered with corrugated metal housed six cars; Building 6, the concrete block administration building, contained offices, a laundry, shower, lunch room, two locker rooms, a health and safety dispensary, and a waste disposal unit; Building 7, of concrete block, was used as a dumping station for Q-11 onto the conveyor for processing (Cahalane 1958: 15).

HISTORICAL CONTEXT

The MSP is significant as a part of the nationwide network of industrial and academic sites established in great secrecy between 1942 and 1946 by the Manhattan Engineer District (MED) under the U.S. Army to develop the atom bomb. MED was responsible for engineering design, procurement of materials, and the selection of sites for the nuclear program. Between 1942 and 1946 there were more than ten contractors and several hundred subcontractors, including industrial companies and universities, involved in the nuclear operations, ranging from the procurement of uranium, its storage, processing and refining, and its development into nuclear weapons (DOE 1980:2-3).

The development of the atomic bomb was tied directly to World War II and the race between Germany and the United States to develop such a crucial weapon. Many of the physicists working on its development in the United States were foreigners who had fled Nazi Europe and were driven by the desire to create a bomb before the German scientists did. In 1939 uranium fission was discovered, and the U.S. government was apprised of its military importance through a letter written by physicists Albert Einstein and Leo Szilard (Stein 1984:5). The following year President Roosevelt established the National Defense Research Committee with a Uranium Committee under it to study the requirements necessary to produce a nuclear chain reaction using uranium as the first step toward production of a bomb. From 1940 to 1942 physicists at various American universities performed experiments with lattice piles of graphite and uranium oxide to see what the "optimum lattice" would be, the size, shape, and placing of uranium within the graphite to produce the desired fission. In 1942 these physicists gathered at the University of Chicago Metallurgical Laboratory, under the direction of Dr. Arthur Holly Compton, to work together toward producing a chain reaction. The first self-sustaining nuclear chain reaction occurred in a squash court under the West Stands of Stagg Field at the University of Chicago on December 2, 1942. Once it was proved that fission could occur, work to develop the atomic bomb continued under MED.

The first gaseous diffusion plant and nuclear reactor, at Oak Ridge, Tennessee, had been built in the wilderness in 1942 by MED as the field headquarters for the Manhattan Project, to separate uranium-235 and to produce plutonium for the atom bomb. In 1943, a second more isolated plant was built at Hanford, Washington, with huge reactors to separate plutonium from uranium for use in the bomb (Mazuzan & Walker 1984: 9-10; Hewlett & Anderson 1962:188-190). The same year an isolated laboratory was established at Los Alamos, New Mexico, under J.R. Oppenheimer (Smyth 1945: 222). Here the first atomic bomb was designed, constructed, and — in July 1945 — exploded at White Sands, New Mexico, leading to the bombing of Hiroshima and Nagasaki and the end of World War II.

In the first few post-war years, the United States held a monopoly on atomic energy and the production of nuclear weapons. The Atomic Energy Act of 1946 established the Atomic Energy Commission, a civilian group, with the directive to develop both military and peacetime uses for the newly discovered nuclear energy. A successor to the MED, it was to be the owner of existing nuclear facilities and any fissionable material which would be produced in the future. Through the influence of Enrico Fermi, who

had worked on the original bomb, the priority turned toward the development of uranium and other raw materials for weapons production and the manufacture of bombs, rather than for peacetime applications (Clarfield and Wiecek 1984:113, 121).

This trend toward military rather than peacetime uses of nuclear energy came about in part because of the change in the political climate from 1945 to 1950. At this time the stance of the United States toward the Soviet Union, its World War II ally, hardened into enmity, which translated into what became known as the Cold War. Through a series of events in the Soviet Union in 1948-49 — such as the detonation of its first atomic bomb, its blockade of Berlin, and its growing influence in neighboring China culminating in the Communist takeover — the United States came to believe that the Soviets were planning both to claim the world for Communism and to eradicate the United States through a surprise nuclear attack (Clarfield and Wiecek 1984:144).

President Truman responded to the Soviet threat with a policy declaration (NSC-68) in 1950 that committed the United States to the arms race against the Soviet Union and approved the production of a hydrogen bomb (H-bomb) and other nuclear weapons as the method for deterring Soviet attack. The AEC was directed to produce "more and bigger bombs," to build reactors to produce plutonium, and to develop uranium and other raw materials (Clarfield and Wiecek 1984:122-34).

During the years from 1946 to 1950, the AEC's first mandate was to rehabilitate the wartime plants, find additional sources of uranium and plutonium, continue to carry out scientific research, and create and stockpile atomic weapons. Each year the president determined the number of bombs to be made as part of the AEC military program, and the AEC carried out the president's mandate, which was to stockpile uranium and plutonium and to make atomic weapons (Stein 1984:8). The AEC retained the contractors from the Manhattan Project, and consequently were able to continue working with highly trained civilians after the war (Mazuzan and Walker 1984:7). MSP continued to provide sampling operations for AEC until 1967.

Sources of Information:

Interviews

Edward Porowski, telephone interviews May 1996, Santa Barbara, California to Piscataway, New Jersey. Former guard at MSP from 1946-1951.

Gerry Blust, April 1996, Middlesex, New Jersey. Bechtel, Site Manager MSP.

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Maps

1927 corrected to 1948. "Bound Brook, New Jersey, including South Bound Brook, Somerset County, and Middlesex, Middlesex County, New Jersey." The Sanborn Map Company, New York, New York.

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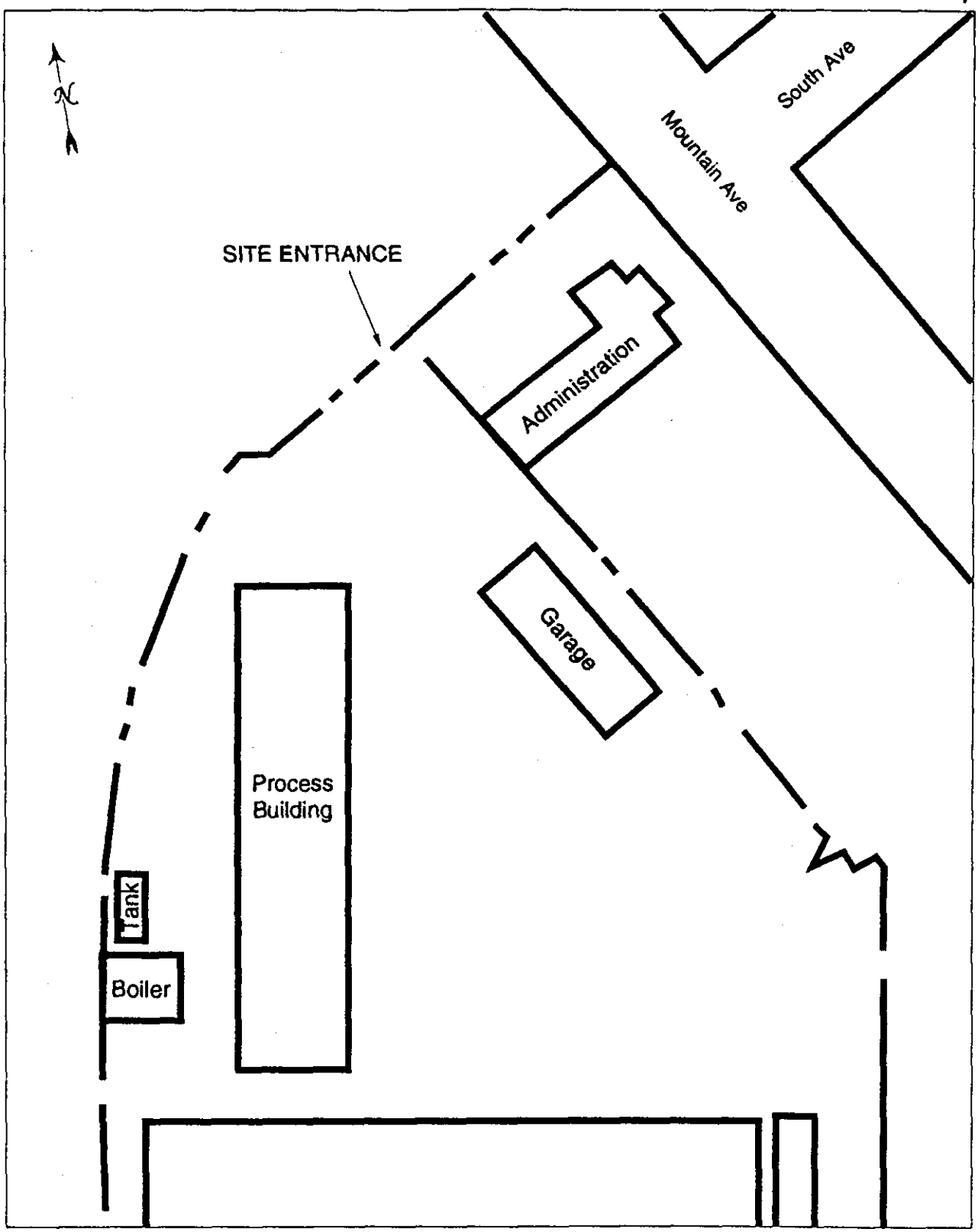

LAYOUT OF MIDDLESEX SAMPLING PLANT. 1996